

- Tubes lacerate, fading to grayish-brown or dirty white; context nearly white; pileus and stipe dull smoky-brown when dry. *S. holocyaneus* (Atk.) Murrill
7. Stipe black and rooting. 8
Stipe neither black nor rooting. 9
8. Pileus smoky-brown, subtomentose; margin thin, inflexed; context white; tubes regular, polygonal, entire, 2 mm. long, 0.5 mm. in diameter; stipe cylindrical, light-brown above, black and rooting below; spores white, elliptical, $7 \times 5 \mu$.
S. radicans (Schw.) Murrill
- Pileus drab-colored, nearly glabrous; margin thin, inflexed when young; context milk-white even when dry; tubes white, irregular, toothed, 1 mm. long, 0.25 mm. in diameter; stipe short, sooty-black as far as the decurrent tubes, attached to buried wood; spores white, $3-4 \times 5-7 \mu$. *S. subradicans* Murrill
9. Pileus gray, glabrous or nearly so; margin very thin; context rosy-gray, soft, fleshy, thin when dry; tubes small, 0.25-0.5 mm., unequal, decurrent; stipe short, concolorous. *S. griseus* (Peck) Murrill
- Pileus brown. 10
10. Stipe dark-purple, very thick; pileus fulvous-brown, purplish at times, clothed with short tomentum, margin very obtuse; context reddish beneath the cuticle, marked when dry with a black concentric line limiting growth; tubes white, 2 to a mm. *S. persicinus* (B. & C.) Murrill
- Stipe yellowish-brown, usually excentric; plants caespitose; pileus yellowish-brown, pruinose; margin thin; context rose-tinted when dry, dark-red next to the tubes, which are small, $1-3 \times 0.3$ mm., decurrent, rose-colored when dry, the edges fimbriate. *S. Whiteae* Murrill

A PALM FROM THE MID-CRETACEOUS *

BY EDWARD W. BERRY

The enormous number of existing palms, considerably over one thousand species, are about equally divided between the oriental and occidental tropics, with many monotypic genera, showing well the marked effects of geographical distribution and isolation on the formation of species. There are no outlying forms, the highest northern latitude reached being about 43° in Europe, and the highest southern latitude about 45° in New Zealand.

Lesquereux writing in 1878 † records fossil palms in 52° north latitude in both America and Europe. Since then remains have been described from as far north as 80° (Grinnell Land, Spitzbergen), and two fine species are recorded from the Tertiary

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† Tertiary Flora.

of Greenland (latitude 70°). A variety of Paleozoic remains have been referred to the Palmae, ranging from *Stigmaria* trunks to Cordaitan leaves and fruits; the nature of the latter having been first rightly conjectured by Brongniart in 1828*. With the marvellous increase, during the last twenty-five years, of our knowledge of the vegetation of the Paleozoic, we can now positively affirm that palms are unknown from pre-Mesozoic formations.

Stenzel, who has recently monographed † the fossil palm-wood of the world, finds the oldest known wood to come from the Turanian of France (1 species); the succeeding formation, the Senonian, has yielded him six species; and, with the ushering in of the Tertiary, the species become numerous.

Undoubted remains of palm-leaves occur somewhat earlier, and the Mid-Cretaceous, in the light of our present knowledge, marks the introduction of this type.

The Cenomanian of Europe has furnished undoubted palm-leaves, and Stur ‡ has described fruit from that formation in Bohemia, and Fliche from the same horizon in France. The next formation, the Senonian, shows species in a variety of genera (*Nipadites*, *Flabellaria*, etc.). It is in the Tertiary, however, that palms become greatly developed and widespread, and the numerous species founded on stems, leaves, petioles, fruits, and even flowers, are referable to a large number of genera (*Gronoma*, *Manicaria*, *Phoenix*, *Nipa*, *Chamacrops*, *Orcodoxites*, *Sabal*, *Iriartea*, *Latanites*, etc.). In this country the earliest known remains are those small fragments of striated leaves, of a rather doubtful nature, which Lesquereux described § as *Flabellaria minima* from the Dakota group (Cenomanian).||

The Montana group, of Senonian or possibly Danian age, has furnished Knowlton ¶ with the undoubted remains of a large

* *Prodrome Hist. Végét. Foss.*

† *Beitr. Palaeont. u. Geol. Oesterr. Ungarn.* 1-182. *pl.* 1-22. 1904. [Folio.] (I am indebted to Dr. F. H. Knowlton for an abstract of this work.)

‡ *Verhandl. k. k. Geol. Reichsanstalt. Wien.* 1873.

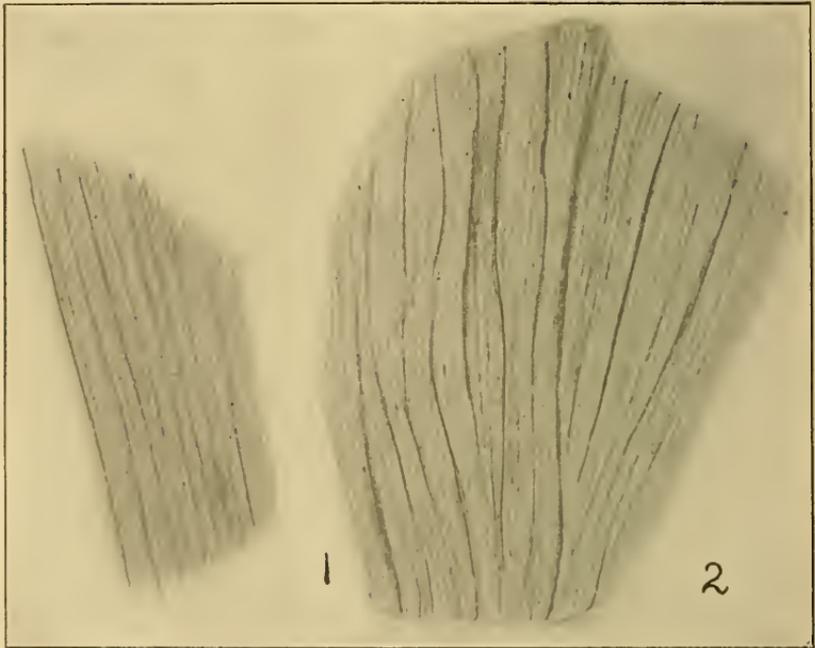
§ *Cret. Flora*, 56. *pl.* 30. *f.* 12. 1874.

|| It is now definitely decided that Hollick's supposed palm, *Serenopsis*, from the Raritan of Long Island, is a *Nelumbo*.

¶ *Bull. U. S. Geol. Surv.* 163 : 32. 1900.

palmetto-like form (*Sabalites*)*, while the Laramie (Danian) furnishes a number of species, some of which, represented by both leaves and fruit, continue through the Eocene and help to make up the abundant palm flora of the early Tertiary in this country.

The characters of fragments of leaves or rays are rarely definite enough for specific or even generic diagnosis, and usage has sanctioned their reference, in cases of doubt, to the genus *Flabellaria* of Sternberg, which, while including some anomalies,



is properly used for those large flabellate leaves, which from the nature of the remains it is impossible to refer positively to *Sabal* (*Sabalites*), *Geonomites*, etc., as is the case with the specimens before me.

Flabellaria magothiensis sp. nov., *figs. 1 & 2*.—Fragmentary remains of large, palmetto-like leaves of considerable consistency; some specimens showing long parallel corrugations, the finer structure being destroyed (*fig. 2*); others finely veined with somewhat heavier veins 2 to 4 mm. apart (*fig. 1*).

* Dawson has also described a *Sabal* from the upper Cretaceous of Nanaimo.

Collected by Bibbins & Berry at Grove Point, Maryland, and Deep Cut, Delaware.

The remains are most numerous at the former locality, where many specimens were collected, the largest 8 cm. square.

They occur in thin layers of clay intercalated between thicker layers of white sand, and from the nature of the deposit and the awkward point of outcrop (beneath an overhanging bluff of clay) it is impossible to get out anything like complete material.

I have no doubt that with the expenditure of much time and labor, better specimens could be secured, and would have deferred publication were it not for the interest attached to so early a species of palm, and I have no doubt that it is a palm, whatever its generic affinities may subsequently be found to be. It is certainly much more positive material than Lesquereux's from the Dakota group, and the figures but poorly depict the specimens which are particularly difficult to represent. Both of the outcrops where these remains occur are in the upper part of what Darton* called the Magothy formation, and which Ward† and others would include in the Raritan. Dr. Wm. B. Clark has recently ‡ suggested that they may be correlated with the exposure at Cliffwood, N. J., thus forming transition beds between the Albian and the Cenomanian. The flora of Cliffwood has certainly a Cenomanian facies, and it remains for an exhaustive study of the flora of the Magothy to determine positively its exact age according to European standards.

PASSAIC, N. J.

SHORTER NOTES

Galactia Curtissii sp. nov. — A shrub, 6 dm. high or less, widely branched, densely tomentulose all over, the branches terete. Leaves 3-foliolate; stipules subulate, 2–3 mm. long; petiole stout, 2 cm. long or less; leaflets oblong, oblong-lanceolate or oblong-oblancheolate, broadest at about the middle, thick, light-green, obtuse at both ends, or subcordate at the base, finely and strongly reticulate-veined beneath, 3–6 cm. long, 2 cm. wide or less, the

* Darton, Am. Jour. Sci. III. 45: 407–419. 1893.

† Ward, Am. Rep. U. S. Geol. Surv. 8²: 871. 1889; *ibid.* 15: 372. 1895.

‡ Clark, Am. Jour. Sci. IV. 18: 435–440. 1904.